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5

ON THE FORMS OF PROGRESSIVE ANAEMIA

By

C. J. Gibson, M.B., 1880.



ON THE FORMS OF PROGRESSIVE ANAEMIA

A Review of recent work in the investigation of these diseases with some personal observations.

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Under this heading fall:

A. The forms of Progressive Anaemia in which the proportion of white corpuscles to red is not increased.

1. Idiopathic Anaemia of Addison.
2. Anaemia Splenica or Primary Splenomegalgy.
3. Hodgkin's Pernicious Anaemia.

B. The forms of Progressive Anaemia in which the proportion of white corpuscles to red is increased.

1. Splenic Leucocythaemia.
2. Lymphatic Leucocythaemia.
3. Myelogenous Leucocythemia.

Though much work has been spent on the investigation of this group of diseases, we have as yet no very clear knowledge as to their Etiology or treatment; this together with the fact that I have met with a considerable number of these cases, must be my excuse for the choice of this subject for this Thesis.

HISTORY.

Most of our knowledge of these diseases dates from comparatively recent times, within the last 50 years.

Thus Idiopathic Anaemia was first described by Addison in 1855, Hodgkin's disease was first distinctly differentiated in 1862, though cases undoubtedly of this nature had been previously described in 1832 if not earlier than that date.

Cases of Leuchaemia were first described by Hughes Bennet of Edinburgh, and by Virchow independently in the same year, 1845.

Splenic anaemia more recently still, the first case in English literature that I can ascertain being one recorded by Pye-Smith in 1875 (1).

Bruhl says (2) "In 1832 Hodgkin described an illness characterised by enlargement of the glands and spleen, but it was not till 1850 that Boufit distinguished by examination of the blood, between cases with leucocytosis and those without. The result of the examination of the blood was to separate from Leuchaemia, the Pseudo-Leuchaemias which are divided into splenic and glandular; of these two the splenic is identical with Splenic Anaemia or Primary Splenomegalgy."

All these diseases present certain features in common which differentiate them from Chlorosis or Secondary Anaemia.

1. Tendency to Haemorrhages of various kinds.
2. Tendency to proceed to a fatal termination, spite of treatment.

(1) Transactions of the Pathological Society, London, 1875.

(2) Archives Générale de Medicine, 1891. Vol. 1, p.673.

3. Want of reaction to Iron, while most of them are influenced by arsenic to some degree.

4. Liability to intermittent attacks of Pyrexia.

5. Obscurity of causation, though in this they resemble chlorosis.

ETIOLOGY.

The causation of these forms of Anaemia is enveloped in obscurity. Thus under Pernicious Anaemia one finds in Fagge's System of Medicine, Vol. II, "cause unknown." In other works: - "Bad and insufficient food." "Bad hygienic surroundings." "Repeated pregnancies." "Over lactation."

At present most observers believe Progressive Anaemia to be a condition of increased blood destruction, and (3) two very different views as to its mode of causation are held. One view, that of Dr Hunter is that Pernicious Anaemia is a definite disease, due to a micro-organism in the intestine which produces ptomaines, which being absorbed into the blood cause destruction of the corpuscles in the portal circulation and the deposit of Iron in the liver.

Another theory, that of Dr Stockman (4) is that there is nothing specific in the causation of these diseases, but that they result from numerous small haemorrhages into the tissues of the body caused by fatty degeneration of the vessels. Neither of these views explain all the conditions met with.

(3) Brit. Med. Journal, 1896, Vol. I, p, 326.

(4) Brit. Med. Journal, 1895, Vol. I, p. 965.

As to the causation of Hodgkin's disease (5) but little is known.

Trousseau suggests that some chronic irritation of the glands such as a discharge from the ear, an abscess, an injury or blow might cause, may be the starting point of the disease.

The following case came under my own observation, where no obvious exciting cause was present and in which the disease apparently began in the glands in the right Iliac fossa.

L.C., age 14, female. First seen July 1896. Complained of pain in right knee and hip, severe enough to keep her awake at night. Duration of pain 2 months, during which time she had been treated for knee and later for Hip disease. On examination of the abdomen enlarged glands the size of an orange were found in the right iliac fossa: enlarged glands were found in right axilla and on both sides of neck. The glands were moderately hard and non adherent to one another. There was general asthenia with reduction in number of red blood corpuscles. No appreciable enlargement of Liver or Spleen, nor any sign of disease in Lung. Pyrexia (100° - 101°) lasting four or five days with long intervening periods of normal temperature occurred. Case was treated with Liq. Arsenicallis, dose increased up to 8 minims three times a day, but the anaemia progressed though the glands remained about the same size, and the patient died in the following December.

Other causes that have been assigned are: Intemperance, mental depression, over-exertion, cold syphilis and other specific fevers.

In Leuchaemia we have apparently some more definite causation in Malaria, which has been noted to precede this disease in a certain proportion of cases, estimated to be about $\frac{1}{4}$ to $\frac{1}{3}$ or more according to the observer. Gowers gives 30 in 150 cases.

In connection with this it may be noted:

1. That a very long interval often intervenes between the two diseases attacking the patient, 10 to 30 years.

2. That is is only a very small proportion of those who have had malaria that subsequently develop Leuchaemia.

Probably the influence of Malaria is more that of a predisposing cause, rendering the organism vulnerable to the onset of the disease, while either some further actual exciting cause, or else a special pre-existing individual susceptibility is necessary to procure its development.

In five cases collected from the transactions of the Clinical Society in none was there a history of Malaria.

Pregnancy and the disturbance of the sexual processes in women are given, though if they were prominent factors in causation one would expect the disease to be commoner in women than it is; other causes assigned are over fatigue, mental worry and anxiety, intestinal catarrh and injuries. (Fagge).

Splenic Anaemia. In a paper on a case read before the Clinical Society of London (6) Dr J. Walter Carr says, "There are two varieties of this disease, (a) the commoner in infants and associated with rickets and congenital syphilis, (b) that seen in older people - cause unknown.

(2) Bruhl gives as predisposing causes fatigue, worry, traumatism, cold with absence of causes ordinarily giving rise to splenic enlargement, alcohol, syphilis, malaria.

Banti (7) thinks that the affection of the spleen is primary, for though a certain amount of enlargement of the spleen is caused by various forms of anaemia, experimental and morbid, yet it never reaches anything like the size attained in this disease. He also thinks that the enlargement of the spleen precedes the anaemia. He says "The changes are not due to the abolition of the function of the spleen, because it can be removed without affecting the health appreciably. It is also very doubtful if the spleen forms red blood corpuscles." If it were due to destruction of red corpuscles in the spleen one would expect to find an Iron reaction, which was absent in a case described by West. (8)

Lastly there is the possibility of some influence of the spleen on the chemical composition of the blood. Dr F. Taylor (9) says: "Briefly I may say, that he (Banti)

(6) Clinical Society's Transactions, Vol. XXX.

(7) Dell'Anaemie splenice, Florence.

(8) Royal Medical Chirurgical Society, London. Transactions, Vol. LXXIX.

(9) Brit. Med. Journal, June 13, 1896.

is disposed to regard splenomegalgy as a pure splenic form of pseudo-leuchaemia, or Hodgkin's disease.

It remains an open question as to whether syphilis has anything to do with the causation of Splenic Anaemia.

In a case referred to by Coupland (9) of anaemia with enlarged spleen temporary improvement followed the use of arsenic. Later on the spleen was excised by Mr Pearce Gould, after which the patient became plethoric. Two years later bleeding occurred from dilated veins in the rectum, haematemesis and ascites followed and then death. At the necropsy a scarred syphilitic liver and dilated veins in the rectum and oesophagus were found. In cases of anaemia with enlarged spleen at Great Ormond Street Hospital conditions of the spleen suggesting syphilis have been discovered post mortem. (10)

So far as statistics go, they show that these forms of anaemia attack males more frequently than females.

From Fagge: -

Leuchaemia 2 males to 1 female

Lymphadenoma 3 " " 1 "

Idiopathic Anaemia, both sexes equally.

In the case of splenic anaemia (2) Brühl mentions 14 cases - 12 males, 2 females.

As to the influence of age: Leuchaemia is most common from 20 to 50, but it has been met with at any age from infancy to 70. The numbers gradually rise taking both sexes to the decade between 30 and 40, which con-

(10) G.F.Still, M.D., Path: Soc: London Transactions
Vol. XLVIII, p. 205.

tains about one third of the total cases. In females, however, the maximum is reached in the decade 40 to 50 (11)

In Hodgkin's disease patients are, as a rule, younger, a large proportion being children. Of 100 cases collected by Sir W. Gowers, 30 fatal cases were under 20 years and 64 under 40 years.

Pernicious Anaemia (Idiopathic of Addison) is most common in middle life.

Splenic Anaemia may occur in childhood associated with rickets and congenital syphilis, or in adult life when cause is unknown.

(2) Brühl says "It is met with during all periods of life with a marked preponderance in adult age.

In progressive forms of Anaemia various nucleated forms of red corpuscles are found.

(a) Normoblasts. (b) Megaloblasts. (c) Microblasts.

(a) Normoblasts: - Normally present in considerable numbers in the bone marrow of healthy persons, and in great numbers after haemorrhage. Generally thought to be a younger stage in the development of the red blood corpuscle. In size and colour like an ordinary red blood cell, but the nucleus to one side, round, and about half the diameter of the cell, which with the Ehrlich Biondi mixture stains a deep blue. As the cell grows older the nucleus is pushed out.

(b) Megaloblasts do not occur in health in any part of the human body; they are found in the foetal marrow,

(11) F. Taylor and W. Gowers in Quain's Dict. of Medicine, Vol. I.

and in the blood of very grave forms of anaemia. The megaloblast is a large cell 11 to 20 μ in diameter, frequently showing marks of degeneration in its protoplasm. Its nucleus is large, filling most of the cell; it may be circular in form, oftener oval or irregular.

(c) Microblasts, consist of a nucleus like that of a normoblast or smaller, contained in a smaller cell body. Their significance is supposed to be similar to that of megaloblasts.

Alterations in the blood in the different forms of Anaemia.

1. Pernicious Anaemia. Idiopathic Anaemia of Addison.

The blood is paler and more fluid than normal, the red cells cease to form rouleaux and present great variations in size and shape. The number of red corpuscles is greatly reduced. The lowest recorded enumeration is 143,000 per cubic millimetre by Quineke. In late stages of the disease 500,000 per c.m. is not rare. The average in 52 cases cited by Cabot (12) was 1,200,000 which he says is the average of patients who feel ill enough to consult a doctor. Remarkable remissions are seen sometimes in the course of the disease, with increase up to 3 or 4 million. Probably these remissions have sometimes been put down to the effect of some particular remedy. As a rule there is a considerable diminution in the number of white cells. In a table of 42 cases in

(12) Cabot's work on the Clinical Examination of the Blood.

Cabot's work, the average was 4200 per c.m. As the disease progresses the leucocytes fall till counts of 500 per c.m. are not rare.

Haemoglobin; a relatively high percentage is sometimes present, but this is not always so. Colour index under 1 in more than half the cases. Cabot thinks an increased colour index a bad prognostic sign.

Nucleated red corpuscles: Cabot says "In all of the 38 cases of pernicious anaemia in which I have examined the blood, the number of megaloblasts has exceeded that of the normoblasts, and as the cases grew worse the megaloblasts grew relatively more numerous, often absolutely as well. The range in variation of nucleated cells has extended in my series from 6 per c.mm to 7 per c.mm." He gives a table of 30 cases with the number of each variety present.

Among the white cells the lymphocytes are relatively increased - thus in a table of 34 cases, the lymphocytes large and small average 45.9%, nine tenths of these being small lymphocytes, eosinophile corpuscles occasionally increased 9% having been noticed.

He thus sums up the changes:

1. Red cells about 1,000,000 per c.mm.
2. White cells much diminished.
3. Haemoglobin variable.
4. Deformities in size and shape of red cells in many cases.
5. Increase in average diameter of red cells.
6. Polychromatophile cells (red)

7. Megaloblasts more numerous than normoblasts.
8. Lymphocytes increased.
9. Small percentage of myelocytes.

(Underlined are the most important characteristics)

The blood in Leuchaemia.

Types (a) Splenic Myelogenous)	These include
(b) Lymphatic)	the vast
	majority.

These two types have two differing blood conditions.

Mixed forms do occur, however.

(a) Splenic Myelogenous. The blood looks natural in colour, but flows sluggishly. Diminution in red cells moderate; Cabot tabulates 34 cases with an average of 3,120,000 red cells per c.mm. Colour index usually normal; i.e., haemoglobin reduced in proportion to reduction in blood cells. The red corpuscles have very numerous nucleated cells among them, even in the absence of any sign of anaemia. They are as numerous in this form as in the worst cases of pernicious anaemia, though the patient may not be feeling very ill.

White corpuscles. - The average number in 30 cases tabulated by Cabot was 438,000 per c.mm. Cases are on record where the white cells were more numerous than the red. A large number of the white cells do not exhibit amoeboid movements. With or without therapeutic agents the white cells may fall to normal and remain there for some time, the patient feeling greatly improved; at such a time leuchaemia would hardly be suspected without a differential enumeration of the white corpuscles, which

exhibit the qualitative changes peculiar to leuchaemia, viz.,

(1) The enormous number of myelocytes, average 37.7% in 18 cases.

This is quite characteristic, the number is not approached in any other disease.

(2) Polymorphonuclear cells, numbers absolutely increased, but percentage diminished. Individual cells showing variation in size, shape and staining properties.

(3) Lymphocytes. It is here that the greatest relative diminution occurs from normal 20 - 30% to an average of 7.6%. Still the absolute number is increased.

(4) Eosinophile corpuscles much increased absolutely, but percentage may or may not be increased.

2. Lymphatic Form.

Number of red cells often lower than in preceding average, 2,730,000. The point of interest is the comparative variety of nucleated red cells which follow the grade of anaemia present.

White corpuscles. Numerical increase not so remarkable as in preceding form, the average ratio of white to red being 1 to 40.

Qualitative changes.

Lymphocytes small, large and transitional, usually make up over 90% of the total number of Leucocytes present: sometimes all small - or all large. In some the Lymphocytes stain readily, in others but faintly.

Qualitative changes tabulated.

	Red Cells	White	Lymphocytes		Myelocytes	Eosino- phile corpuscle
			young	adult		
Normal	5,000,000	7,000	20-30%	48%	none	$\frac{1}{2}$ -4%
Spleno-myeloid:	about 3,000,000	450,000	7.6%	50%	39%	4.4%
Lymphatic	about 3,000,000	100,000	96%	3%	none	none

The blood in Hodgkin's disease.

Cabot says: "The diagnosis of this disease without the blood count is impossible. Its pathology is identical with leuchaemia, and even post mortem the two diseases are indistinguishable as far as the lesions outside the blood are concerned. Yet the blood is not peculiar, but presents the characteristics of normal tissue. Its value is as a negative evidence."

Transitions to Leuchaemia have taken place under the eyes of competent observers, though very rarely.

In early stages the blood is normal, but as the disease progresses the haemoglobin begins to fail, and later the corpuscles, until the blood may reach the severest grade of anaemia. In acute cases anaemia may develop very rapidly.

The blood in Splenic Anaemia.

According to Dr Taylor (14) in his opening of the discussion on pernicious anaemia at the British Medical Association Meeting in 1896, the blood shows a chlorotic

(14) Brit. Med. Journal, Sept. 19, 1896.

type, the red corpuscles being diminished, less in number than the haemoglobin in amount. There is no leucocytosis. This coincides with the statements of other observers. According to Brühl, there are some microcytes, but no Poikilocytosis, but Banti describes the corpuscles as being deformed sometimes.

In 18 cases tabulated here, microcytes are mentioned as being present in two, and where the haemoglobin was observed it was generally more decreased than the corpuscles. In a case which I had the opportunity of observing, No. 18 in the table, the red cells retained their shape, but were reduced to 2,000,000 per c.mm.

Numerous microcytes were noted.

The white corpuscles were much reduced in number.

SYMPTOMS

Progressive Anaemia! Briefly enumerated the following are met with: -

1. Gradually increasing debility, generally the first thing noticed.
2. Lemon yellow colour of skin.
3. Emaciation absent, though muscles are said to waste.
4. Indisposition to exertion with breathlessness and faintness on attempting it.
5. Slight oedema may appear about the ankles.
6. Attacks of pyrexia occur during the course of the disease.
7. A dark pigmentation of the urine often observed
8. Haemorrhages may occur from the nose, gums, etc.
9. Vomiting and diarrhoea may be present.
10. The usual haemic murmurs.

Hodgkin's disease: - The symptoms are those of severe anaemia, with enlargement of the lymphatic glands varying in extent and locality. Generally the lymphatic enlargement is first noticed, beginning in the cervical glands in most cases. (15)

In some cases some pressure effect is first noticed, such as pain from pressure on a nerve. The glands vary in size and are as a rule non-adherent. The spleen is as a rule only moderately enlarged.

Other symptoms are weakness, dyspnoea, oedema of extremities, ascites or hydrothorax, haemorrhage from nose, gums or under skin:

Death occurring from exhaustion, suffocation, haemorrhage, pneumonia or coma.

Leuchaemia: - In many cases the first thing noticed is the swelling and hardness of the abdomen, as was the case with several of those in the table appended. Or pain in the hypochondrium may be first noticed. The spleen is generally found to have attained a large size by the time the patient comes under observation. The Liver is generally moderately enlarged and can be felt below the ribs. In some cases the lymphatic glands are enlarged. The bones may be tender, owing to involvement of the bone marrow. The patient does not lose colour till late in the disease. There is generally some pyrexia, sometimes alternating with periods of apyrexia.

Dyspnoea is present, also haemorrhages, epistaxis, haemoptysis, haematemesis, bleeding gums, blood under skin or retina. Urine acid: spec. grav. high. Urea and uric acid in excess.

Splenic Anaemia: -

There are two modes of onset.

(a) The usual symptoms of anaemia without apparent cause - pallor of skin with extreme languor.

(b) Local signs may call attention to spleen. Sometimes attacks of pain comparable to visceral colic first attract attention. The pain is felt in the left hypo-

chondrium, increased by pressure and radiating to the back and shoulders. It is associated with fever. At the same time there may be nausea, vomiting or uncontrollable diarrhoea.

Bruhl (2) considers that the pain is not the commencement of the disease, but merely attracts attention to the disease which has hitherto been latent, for the spleen is already considerably enlarged. There is some wasting mostly affecting muscular tissue. The skin has a very pale yellowish tinge. Appetite and digestion appear at first to be unaffected.

The Spleen is found to be much enlarged down to or below the umbilicus when the patient first comes under observation. The Liver may be normal, but often there is enlargement.

Nausea and vomiting come on in the later stages.

Constipation is common, but profuse diarrhoea of a dysenteric type may at times be present.

Albuminuria exceptional.

Epistaxis appears to be the only form of haemorrhage at all common.

Termination usually fatal.

The course of the disease shows increased anaemia and feebleness, leading to exhaustion, haemorrhage or coma; occasionally pneumonia carries the patient off.

In the two cases that I have had the opportunity of examining, slight attacks of epistaxis in the one, and haematemesis in the other were the first indication of anything amiss.

Bruhl divides the course of the disease into three stages, a similar division being followed by West. (16)

1. Symptoms of increasing weakness with occasional attacks of pain in splenic region.

2. Anaemia more marked, spleen much enlarged.

3. Final stage, cachexia and death.

The patient does not usually come under observation till the second stage has been reached.

Morbid Anatomy.

Pernicious anaemia: - No emaciation, as a rule, subcutaneous fat abundant and of a yellow colour. Skin of a lemon tint. Muscles may have an intensely red colour. The tissues show a tendency to fatty degeneration. Small haemorrhages may be found in the various organs and under the skin or mucous membrane.

The Heart is specially affected with fatty degeneration. The spleen may be moderately enlarged, usually showing signs of excess of Iron pigment. The Liver shows fatty degeneration, and on treating sections with ammonium sulphide black staining is seen, due to a deposit of Iron in the outer and middle parts of the lobules. Osler says "In two specimens I have examined it seemed to have such a distribution that the bile capillaries were distinctly outlined. This is certainly, as Hunter states, a specially characteristic lesion, possibly peculiar to pernicious anaemia.

A.J. Scott examined for me the Livers in 45 conse-

cutive autopsies without finding (except in pernicious anaemia) this special distribution of pigment.

The stomach may be normal, but may be atrophied, and the secreting structures destroyed.

The lymphatic glands may be of a deep red colour, while the bone marrow may be like that of a child.

Sclerosis may be found in the posterior columns of the spinal chord. Cases reported by Lietheim, Morris, Lewis, O'Brien.

Dr James Taylor (17) read a paper in which these changes were fully described.

Leucocythaemia.

Wasting in some cases very marked. The heart and veins may be distended with clots, and the increase of the white corpuscles gives the clots a puriform appearance as in Virchow's case, where on opening the right ventricle he thought he had cut into an abscess.

Alkalinity of blood diminished.

Fibrin increased. Charrot's Crystals separate from the blood after death.

The spleen is enlarged to a great size. It may show adhesions due to peri-splenitis and infarcts.

It cuts with increased resistance, and the malphigian corpuscles are not conspicuous.

On microscopic examination the stroma of connective tissue is hypertrophied. The malphigian corpuscles may not be visible, or may be found to have undergone fatty

(17) Med. Chir. Soc. London, Transactions, Vol. LXXVIII, p. 151

or lardaceous degeneration.

In primary lymphatic leuchaemia, the malphigian corpuscles may be conspicuous and form small growths. The lymphatic glands are affected in one third of the cases of primary splenic Leuchaemia. (18) They rarely reach the size of a walnut, and present on section a smooth, soft grey or reddish white appearance. The microscopic appearance is normal, rarely showing increase of reticulum as in Lymphadenoma. Lymphoid growths may be found in the tongue, gums, tonsils, walls of stomach, solitary and agminate follicles of the Intestines and in the peritoneum.

The liver is enlarged in at least two-thirds of the cases (18) weighing from 5 to 14 lbs. Small lymphoid growths, interlobular in position, often surrounding the portal vein are found. In some cases there is marked fatty degeneration. Pleural effusion is common, and lymphoid growths may be found on pleura or in lung.

Haemorrhages into the substance of organs or under serous membranes may be found. Also retinal haemorrhages with plugging of capillaries.

The bone marrow is sometimes affected, though primary myelogenous leuchaemia is almost unknown. The marrow is grey or reddish grey and diffuent, showing microscopically lymphoid cells and red corpuscles. These changes are most marked in spongy bone with red marrow, but are also found in the long bones.

(18) F. Taylor and W. Gowers. Quain's Dictionary of Medicine.

Lymphadenoma.

The groups of glands are affected in the following order of frequency (18): Cervical, axillary, inguinal retro-peritoneal, bronchial, mediastinal, mesenteric. Nodular growths may arise along course of lymphatics resembling glands. They are at first distinct, and non-adherent to one another, but later on become conglomerate by the growth perforating the capsule and extending to adjacent parts. Their consistence may be hard or soft. Usually in the more chronic cases the glands are hard, colour yellowish or whitish grey, and showing tracts of fibrous tissue. Osler says that in the majority of cases the glands are soft and elastic. In the later stages the capsule is often perforated.

The spleen is affected in $\frac{3}{4}$ of the cases (Gowers). Usually there are growths of lymphoid tissue arising from the Malphigian corpuscles, causing the appearance known as hard bake spleen. The weight is from 10 to 30 oz.

In some cases the splenic pulp may be normal or compressed and atrophied. The medulla of the bones in rare cases presents lesions similar to those existing in Leuchaemia and Pernicious anaemia. Adenoid tissue elsewhere undergoes similar changes to the glands; i.e., the tonsils, mucous membrane of pharynx, oesophagus, stomach and intestines.

Splenic Anaemia.

The Liver and Spleen are the organs chiefly affected. The spleen very much enlarged, up to 5 or 6 lbs.

in weight. Consistence firm, colour red brown. The capsule markedly thickened and adherent to surrounding structures; it may also present areas of cartilaginous hardness.

Microscopically the marked change is increase of fibrous tissue, specially round Malphigian corpuscles, many of which are atrophied and replaced by fibrous tissue. Infarcts may be found.

Dr J. R. Williamson (19) has described nucleated cells containing 6 to 10 red corpuscles each.

The liver is somewhat enlarged and slightly cirrhotic. Traces of haemorrhage may be found in the mucous and serous membranes.

DIAGNOSIS

In many cases this is easy, but not in all; for instance I have seen a case of tubercular disease of the Appendix and coecum mistaken for Pernicious Anaemia and so treated.

Patient was a girl, aged 21, not emaciated, yellowish in colour, and apparently extremely anaemic. She had extreme asthenia, haemic bruits, and pallor of mucous membranes.

In the right side was a smooth, freely movable, painless swelling which was taken to be a floating kidney. Obstinate constipation, no action of bowels without enema. The case resisted all treatment, and the patient died.

Post mortem tubercular disease of appendix and coecum was found. Obscure malignant growths have often given rise to similar errors.

Progressive Anaemia has to be diagnosed from: -

1. Bright's Disease.
2. Ulcerative Endocarditis.
3. Tuberculosis
4. Addison's disease.
5. Cirrhosis of Liver.
6. Cancer of stomach and other intestinal organs.
7. Chronic Ulcer of stomach.
8. Parasitic affections such as ankylostoma duodenale.
9. Chlorosis.

Leuchaemia. - Here we have two very prominent factors to aid in the diagnosis.

1. The great size of the spleen.
2. Specially the condition of the blood.

No certain diagnosis can be made without a careful count of the red and white corpuscles of the blood, and in many cases several counts. It has been said that one ought not to diagnose Leuchaemia, unless there is a higher proportion of white to red than 1 to 20, but I should think that this proportion or anything near to it maintained for some time quite sufficient to go upon.

Leuchaemia has to be distinguished from:

1. Splenic Anaemia.
2. Chronic Malaria with ague cake spleen.

3. Lardaceous spleen.

4. Primary Lymphatic form requires to be distinguished from Lymphadenoma.

In all cases careful observation of the blood ought to settle the diagnosis.

Lymphadenoma.

The diagnosis here may be much more difficult than it is likely to be in leuchaemia, as we have no distinctive blood condition to help us.

It has to be distinguished from general Tubercular infection of the glands where great anaemia and asthenia may be present. The distinctive features are: -

1. We see fever free periods as a rule in Lymphadenoma, but not in Tuberculosis.

2. The Tubercular glands tend to break down and soften, also early to adhere together and to adjacent structures; while in Lymphadenoma the glands do not break down and at first are non-adherent.

3. Signs of Tuberculosis in some other organ, and family history.

Carcinomatous glands are very hard, they infiltrate and adhere to surrounding tissues, they occur usually in the middle-aged, and a primary growth can generally be found.

Splenic Leuchaemia and Lymphatic Leuchaemia are to be diagnosed from the condition of the blood.

Splenic Anaemia must be distinguished from: -

1. Anaemia with lardaceous disease of spleen, due

to Tuberculosis, long continued suppuration or syphilis.

The cause of lardaceous enlargement may not be apparent, and anaemia being present a mistaken diagnosis be made. In case 17 of the table, lardaceous disease due to obscure Tuberculosis or to Syphilis was suggested in diagnosis.

(2) I have seen a case of severe haematemesis in a single woman of 24, which recurred 6 or 7 times, and which was accompanied by an enlarged spleen. A diagnosis of Splenic Anaemia was made. The attacks of Haematemesis recurred two or three times a year, and were so severe as to bring her to the verge of death. Red Corpuscles fell to 1,000,000 per c.mm., after the attack, but they rapidly regenerated again. The spleen reached the Umbilicus. After an attack death occurred, and at the post mortem old standing thrombosis of splenic and portal veins was found.

(3) From malarial enlargement of spleen - by the history of the case and by the absence of plasmodiae.

(4) From enlargement due to Syphilis by the absence of history or signs of Syphilis. Dr Still (20) records cases of children with anaemia, the post mortem showing conditions of spleen such as are met with in Syphilis.

(5) From Leuchaemia by condition of blood.

(6) From enlarged spleen with cirrhosis of liver.

TREATMENT.

This will be dealt with under the following headings:

1. Rest and diet.
2. Drugs - Arsenic, Phosphorus, Quinine.
3. Antiseptic treatment.
4. Oxygen inhalations.
5. Transfusion.
6. Bone Marrow.
7. Splenectomy.

1. Rest and Diet.

Rest is important in the treatment of all these cases of severe anaemia. Most cases come under observation, as a matter of fact, at about the time that they cease to be able to do their ordinary work.

The advantages of rest are:-

- (1) It gives the heart which is generally dilated, and sometimes has fatty degeneration of its walls, a chance of recovering itself, so that the blood supply to the tissues is improved and oedema lessened.
- (2) In the normal blood the colour index of the red blood cells is found to be increased after a night's rest, so that it must probably help the blood to recover from deterioration and loss of haemoglobin.

Diet must be nutritious and easily digested, great

care being necessary in cases where diarrhoea and vomiting are so easily set up.

2. Drugs:

The drug chiefly used for these diseases is arsenic, and it is the only one from which I have seen much benefit. It may be given in the form of Liquor Arsenicalis or Liq: Arsenii Hydrochlorici, or as Sodium Arseniate or Arsenious Acid in a pill. It must be given in large doses to cause any appreciable benefit. Thus Liq: Arsenicalis has been given to the extent of m.100 per diem for some time in a case of Leuchaemia.(21) In this case the white corpuscles decreased from 1 to 14 to 1 to 400 red between August 11th and November 28th, 1891, accompanied by an appreciable diminution in size of spleen.

I have seen a case where under arsenic the white corpuscles fell from 1 to 3 to 1 to 40 with much general improvement of the patient's condition but no alteration in size of spleen. In pernicious anaemia it is, however, more often given with success than in leuchaemia.

In splenic anaemia I have seen it tried twice, but in neither case did it have any effect in arresting the disease. In some cases of Lymphadenoma it has a marked effect in large doses. In all the cases there is a marked tendency to recurrence of the disease on

(21) D. Drew M.B. Clin: Soc: Trans: Vol.XXV.

cessation of the treatment.

The remedy should be commenced with comparatively small doses m.5 to m.6 per diem, and increased rapidly it is tolerated well. If diarrhoea be caused a few minims of Tr Opii may be added. One must bear in mind the possibility of peripheral neuritis, pigmentation of skin, and irritation of mucous membrane occurring when giving arsenic in large doses. Phosphorus has been given in Leuchaemia and Pernicious Anaemia, and cases are recorded where it seems to have had a beneficial effect, but it has not been found so reliable as arsenic.

Quinine has been used, and a case of recovery from Leuchaemia under large doses of this drug has been recorded. Iron need only be mentioned to note its uselessness in such cases. I have seen Iron used along with Bone marrow for Splenic Anaemia.

3. Antiseptic Treatment.

This treatment is used on the theory that the disease is caused by ptomaines formed in the intestinal tract destroying the blood. I find a case recorded by Gibson (22) of its use in Pernicious Anaemia. The patient, a man of 55 years of age, who had probably suffered from Malaria in India, had also had renal calculus. The blood state on commencement showed

(22) Trans: Med: Chirug: Soc: Edinburgh. Vol.XI,
p. 258.

800,000 red per c.mm. Under arsenic he got worse, then temporarily improved under transfusion, and then was put on B.naphthol 2 grs. three times a day in pill, and after some time he began to improve till the red corpuscles numbered 3,600,000.

I am not aware that this mode of treatment has been used in any of the other diseases under discussion.

4. Oxygen Inhalation.

This treatment has, as far as I know, been only used for leuchaemia; except the case mentioned below, Kirenberger's case, which seems to be doubtful. In a paper read by Dr F. Taylor (23) a case of leuchaemia is described as having been treated by Oxygen Inhalation, 40 litres daily, arsenic also was given. A great improvement in the blood state ensued. On starting white corpuscles numbered 1,000,000, red 1,880,000 (Nov.3rd), on Dec. 16 white 20,000, red 3,130,000. The spleen diminished in size, the patient gained in weight. In the same paper he refers to a case by Kirenberger in a boy 10½ years old, which also improved under similar treatment. It is doubtful whether this case were not one of splenic anaemia. In a case so treated by Riegel, considerable improvement of anaemia and general health occurred, but on cessation of the Oxygen, the patient relapsed and died in spite of the readministration of the Oxygen. Pleitzer also reports a case improved by

this means.

The experience of different observers as to the value of this method of treatment is various; some have obtained favourable results (Sticker, Pleitzer, Da Costa, Sequin), while others (Schultz, Stinzing, Mosler) have not met with any good result.

At any rate, the result of one or two cases make it appear worthy of a more extended trial, though there is the same liability to relapse as after other modes of treatment. Of course, if the cause of these diseases were known exactly, the treatment would follow; till then treatment must be empirical.

5. Transfusion.

This mode of treatment has been used in some cases with apparently good results. Appended to this is a table of 5 cases so treated by Dr. Brackenridge M.D., and reported in the Med: Chirug: Soc: of Edin: Transactions, Vol. XI. The method used was the indirect, blood mixed with $\frac{1}{3}$ its volume of Sodium Phosphate solution 1 in 20.

Of these cases, the post mortem on No.5 would seem to throw some doubt upon the diagnosis. No.3 died a few days after the first injection. No.1 improved at the time, but relapsed and died after a few months. No.4 was still under treatment. No.2 showed apparently permanent improvement.

In face of this, further evidence is required to establish this as a reliable mode of treatment, specially

as there seems to be a certain amount of risk attending the operation.

6. Bone Marrow.

It is only recently that the Haematinic effects of red bone marrow have been appreciated. It has been chiefly used in pernicious anaemia, and several cases have been reported where it has produced a marked improvement. I have seen it used with conspicuous success in a case of splenic anaemia, and in extreme anaemia after haematemesis.

In the case of Splenic Anaemia the patient (No.18 in table) had been going from bad to worse under arsenic, and had got ascites and oedema of legs. Red corpuscles 2,000,000. He was then tried with bone marrow, 1 tabloid per diem, and in six weeks the corpuscles had increased to 4,300,000.

Two months later he was still well, had returned to work, but was still taking the tabloids.

Bone marrow may be given in tabloids, or as an elixir or in sandwiches, or spread on bread and butter.

Its mode of action is doubtful, but it is said to act by stimulating the blood-forming organs.

7. Splenectomy.

This has been practised as a remedial measure in splenic anaemia and in splenic leuchaemia. Appended are two tables of splenectomies with the results in various diseases. One by Mr H. Collier (24) gives 16

cases operated on for Leuchaemia, every one of which ended fatally, and nearly all from haemorrhage. He also gives 13 other cases with 8 recoveries. The other table is by Adelman and is quoted by Spencer Wells (25) giving 19 cases operated on for leuchaemia with only one recovery, the only one probably that has recovered in this disease.

Forty-four other cases are recorded with fifteen recoveries.

Splenectomy for Leuchaemia may now be considered an unjustifiable operation.

In splenic anaemia it is not so fatal, and in the cases tried seems to have led to arrest of the disease, but the patients have remained anaemic.

(25) Trans: Med: Chirug: Soc: London, Vol.LXXI.

SUMMARY OF A TABLE OF CASES OF
SPLENECTOMY BY H. COLLIER.

Disease.	No. of cases.	Recovery.	Death.
Leuchaemia	16	0	16
Simple Hypertrophy	3	2	1
Malarial "	3	2	1
Wandering spleen	3	2	1
Splenic Cysts	2	1	1
Hydatid			
Secondary tumour	1	0	1
after cirrhosis			
Sequestered spleen	1	1	0
in peritoneal abscess	<hr/>	<hr/>	<hr/>
	29	8	21

TABLE BY ATHELMANN QUOTED BY SPENCER WELLS.

Leuchaemia	19	1	18
Simple Hypertrophy	14	1	13
Malarial "	4	1	3
Wandering spleen	9	7	2
Splenic Cysts	4	3	1
Hydatid	1	1	0
Sarcoma	1	1	0
Suppuration	<hr/> 1	<hr/> 1	<hr/> 0
	53	16	37

TABLE OF SPLENECTOMIES FOR DISEASE OF SPLEEN ASSOCIATED WITH LEUCOCYTHAEMIA.

						Incision		Pedicule		
						Left side	Right side	Clamp.	Vessels tied	
1866	Bryant	M.	20	Leucocythaemia	6 months	Left side		Clamp.	3 Vessels tied pedicle in 2 parts.	Died 1½ hrs. 4 lbs. 7 ozs.
1867	"	F.	40	"	2 years	"		Pedicule ligd. in 4 with strong whipcord.		" Haemorrhage in 15 min. 10 lbs. 4 ozs
1867	Koeberté	F.	42	"	3 years	Median		Vessels tied in 6 or 7 places		" Soon after 17 lbs 8 ozs.
1873	Spencer Wells	-	-	"	--	--		--		" Peritonitis 3 days
1876	Spencer Wells	-	-	"	--	--		--		" Haemorrhage few hrs.
1873	Watson	M.		"	2 years	Median		In two halves		" Haemorrhage or shock during operation 12 lbs.
1877	Billroth	F.m.	45	"	3 years	--		6 parts		" Haemorrhage 4 hrs. 6 lbs. 9 ozs.
1877	Billroth	M.	40	"	4 years	--		10 parts galvano-cautery		" Haemorrhage within an hour 11 lbs. 11 ozs.
1877	Langley Brown	M.	20	"	8 months	---		Vessels separated double ligature		" Shock in 5 hrs. 18 lbs. 8 ozs.
1877	Simmons	M.	40	"	3 years	--		Many divisions		" Haemorrhage in 2½ hrs. 7 lbs. 8 ozs.
1877	Fuchs	F.m.	40	"	1½ years	--		9 ligatures		" Haemorrhage in 18 hrs. 12 lbs. 13 ozs
1878	Czerny	-	-	"	--	--		--		" Haemorrhage in few hours.
1878	Arnison	M.	37	"	1 year	--		3 whipcord ligatures		" Haemorrhage in 5 hrs. 7 lbs. 3 ozs.
1878	Griswell	F.m.	39	"	--	--		--		" Haemorrhage in 16 hrs. 9 lbs. 8 ozs.
1881	Haward	F.m.	49	"	--	--		--		" Shock in 5 hrs.
--	Baker Brown	-	-	"	--	--		--		" Shock during operation.

From H. Collier - Lancet, 11 Feb. '82, p. 221.

TABLE OF SPLENECTOMIES. FOR DISEASE UNASSOCIATED WITH LEUCOCYTHAEMIA.

Operator	Date	Patient	Disease	Duration	Incision	Pedicle	Result	Weight of		Complication
								Spleen.	lbs. ozs.	
Zaccarelli	1549	F.m.24	After ague	No account	Over tumour	Ligatured en masse	Recovery	2	15	
Ferrerius	1711	F.m.30	Sequestered spleen in peritoneal abscess.	5 months	Abscess opened.	--	"	No account		
Quitterbaum	1826	F.m.22	Secondary tumour after cirrhosis	1½ years	Median line	1 ligation	Died	5.	8	Haemorrhage
Küchler	1855	M. 36	Hypertrophy from malaria	1 year	External edge of rectus.	7 ligatures	"	3.	5	Haemorrhage artery not tied.
Spencer Wells	1865	F.m.34	Simple Hypertrophy	1 year	7 inches ext. edge of rectus	Ligatured in 2 bundles. 2 art. 12 veins tied.	"	6.	15	Thrombosis in 158 hrs.
Péau	1867	F.s.20	Hypertrophy Cyst	2 years	Median line	4 metal ligatures & cautery	Recovery	2.	8.	
Urbinate	1873	No account	Hypertrophy of wandering spleen	Not given	---	7 ligatures	Died	2.	14	Peritonitis
Koeberté	1873	F.m.27	Hydatid	4 years	---	--	"	--		Shock.
Péau	1876	F.m.24	Simple Hypertrophy	1½ years	Median	En masse	Recovery	2.	7	
Martin	1877	F.m.31	Wandering Spleen	2 years	---	Vessels tied	"	--		
Czerny	1876	F.m.30	---	---	---	En masse	"	--		
D'Orsay	--	--	Malaria	---	---	---	"	--		
Franzolini	1881	--	Simple Hypertrophy	---	---	Ligatured and re-turned	"	3	lbs.	

From H. Collier, Lancet, 11 Feb. '82, p.221.

SPLENIC ANAEMIA.

Age & Name	By whom reported	Symptoms and Duration	History	State on admission	Treatment and result
54)	Brühl Archives Général de médecine	Loss of strength one year - anorexia intermittent diarrhoea. Severe abdominal pain. Lately attacks of Epistaxis. Severe attack of pain with vomiting brought him under treatment.	No malaria. No syphilis always been healthy.	July 20, '90 Anaemic Spleen fills $\frac{1}{2}$ abdomen. Liver enlarged. Appetite, digestion & bowels normal. Heart normal - no large glands - urine normal. Muscles wasted but not fat. Blood, no poikilocytosis red 2851350 white 10757.	3 different attacks of pain with fever, nausea vomiting diarrhoea - spleen very large. Died Dec. '90 No P.M. Duration 18 months.
n. 18.)	Banti Dell' Anaemic Splenica	Repeated Epistaxis. Did not know of abdominal tumour, but complains of weight in left side. Increasing asthenia.		Extreme anaemia. Great enlargement of spleen. red 3,999,000 white 4,704	In spite of treatment spleen remained stationary. Anaemia increased persistent diarrhoea. Epistaxis ascites. Death. No P.M.
nan 16)	Same	For 2 years hard enlargement of spleen, frequent epistaxis, occasionally irregular fever. For 1 year increasing anaemia, diarrhoea, ascites.		Hard enlarged spleen No enlarged glands Anaemia ascites red 3,948,000 white 6,876 Haemoglobin 68%	Splenectomy. Death from haemorrhage. P.M. Peritoneum thick opaque false membrane. 1,900 grammes blood in peritoneum. Liver granular.
nan 72)	Same	Feeling of weight in left hypochondrium for 1 year. Rapid loss of strength Intermittent diarrhoea.		Spleen large. Liver enlarged. Red 3,720,000 White 19,805 many microcytes	Died of Pneumonia P.M. 150 grammes fluid in peritoneum Liver large congested. Spleen 1255 grms. Similar to last case.
n 0)	Potam Semaine Medical 1887 p.359	Epistaxis since infancy. 4 years gradual loss of strength. Bronchitis in '85 with albuminuria which disappeared in 1886.		Pulse feeble frequent epistaxis. Liver normal Spleen enormous Red 2,000,000 White none seen Haemoglobin $\frac{1}{3}$ normal	Died.

Age & Name	By whom reported	Symptoms and Duration	History	State on admission	Treatment and result
an 46 6)	Landoiz Bulletin de la Société Anatomique 1893	Extreme feebleness, repeated epistaxis for 1 year.	No history.	Blood 1,000,000 red White 1 to 312 red	Anaemia progressed died of syncope P.M. spleen 1550 grms. Traces of perihepatitis.
an 25 7)	Strümp- hell Archives de Heil- kunde p.17 & 18	Intestinal trouble for 6 months. Anorexia vomiting diarrhoea with fatigue anaemia.		Spleen enlarged. Blood no leucocytes Both corpuscles and haemoglobin reduced Haemoglobin most.	Transfusion caused improvement, then there was a recur- rence. Died. P.M. Liver enlarged Spleen 13 c.m. by 7½. Microscope showed dilated veins
an 56)	Muller Berlin Klin: Wocken- schrift 1867.	Pain in left hypochondrium 6 years. A gradually increasing tumour frequent slight jaundice.	Ague in 1866.	Is feeble, very pale. Liver slight enlargement, spleen much enlarged Blood no leucocytes	Died of asthenia. P.M. spleen enormous. No visible malphigian cs. many infarcts. Liver large.
n 56)	Same p.186	Complains of increasing feebleness for 1 year		Noticeable increase in size of spleen. Also of liver. Attacks of perisplenitis Blood no leucocytes	Rapid increase in anaemia, became comatose and died. P.M. enormous spleen Two slightly enlarged glands in mesocolon.
40 0)	Woolley Bulletin de la société medicale des Hos- pitaux 1856.	Alcoholic in youth. Asthenia and diarrhoea for 3 months. Irregular fever with anorexia and nausea.		Very anaemic, oedema of legs. Palpitation, Pain in left hypochondrium. Spleen down to Iliac fossa. No leucocytosis.	Death from perforating ulcer of Intestine. P.M. General peritonitis, spleen large hard with infarcts.
n 23 1)	Collin Bulletin de la société medicale des Hos- pitaux 1862	Pain in left hypochondrium subicteric tint. Spleen measured 16 c.m. Liver enlarged		Spleen enormous. Patient feeble and cachectic. No leucocytosis.	Died Dec. 1862. Peritonitis. P.M. Spleen enclosed by copious false membrane enclosing 1 litre of pus. Parts of capsule thick white cartilagenous. Weight 1970 gms. Liver large lardaceous.

Age & Name	By whom reported	Symptoms and Duration	History	State on admission	Treatment and result
an 32 12)	Muller De l'An- aemie progres- sive Zurich 1877	4 successive attacks of anaemia Hypertrophied spleen.		Enlarged spleen no leucocytosis, no alteration of corpuscles but not counted.	Died. Swelling of spleen had disappeared gradually during last month.
n 36 3)	Dr.S.West Med:Chir: Soc: London June 9, '96.	Illness began with bleeding after tooth extraction - frequent epistaxis - gradually weakening.		Thin, pale, yellow colour. Spleen enlarged also liver. Temp.100 to 101 on most days. Blood red 50% " white 20%	Treated by Tr Ferri Perchl. Then arsenical solution m.12 ter die. No marked improvement. Bone marrow Feb.4th to May 27, gain in weight 20 lbs. liver and spleen remain the same.
y 10 4)	J.W.Carr Chir:Soc: Trans: Vol.XXX Nov.27, '96.	Never strong - always yellow and short of breath - not possible to exclude congen: syphilis.		Spleen and liver large and tender, is very anaemic. Temp.103, red cells and haemoglobin much reduced. No leucocytosis.	Had bleeding from gums pyrexia, loss of strength, retinal haemorrhage. Oedema of larynx required tracheotomy from which he died same day. P.M. Liver and spleen large - no iron reaction in either.
n 46 5)	Pye-Smith Path: Soc: Trans: Vol.XXVI	Purged and passed blood 2 years ago, after that felt abdomen and scrotum swelled gradually lost strength and flesh.	Free drinker Rheumatic fever 30 yrs. ago.	Emaciated, not anaemic, purpuric spots on legs - no fever dropsy or jaundice Liver and spleen enlarged Blood normal proportion.	Albuminuria appeared Heart enlarged - died in a month. P.M. Adherent pericardium spleen 83 oz. Malphigian corpuscles, unusually plain. Liver 88 oz. shewed scattered whitish yellow nodules. No sign of syphilis.
P. 30 ale 5)	Personal observation.	'94 miscarriage in bed 3 weeks '95 Influenza endometritis May '95 vomiting and diarrhoea with epistaxis once a month. Has been wasting	No history of malaria	Spleen enlarged from under ribs to 2 inches from umbilicus. Liver slightly enlarged. Loud systolic murmur at cardiac apex; also haenic murmurs Oedema of feet and legs.	Treated with arsenic Liq: Arsen: m.8 ter die. Diarrhoea continued - a week later large gangrenous patch appeared on inside of cheek and spread to jaw. Had a fit and died. No P.M.

Case & Name	By whom reported	Symptoms and Duration	History	State on admission	Treatment and result
		and losing colour since Feb.'95. Swelling of abdomen noticed since Feb.'95.		Red corpuscles 2,000,000 White 1 to 200 red	
W. 26 7)	Personal observation	Has had two attacks of haematemesis 1st 1 year ago. Complained of flatulence and distended abdomen, with increasing weakness and loss of flesh.	Same.	Spleen enlarged to 2 fingers breadth of umbilicus. Hard no pain on pressure. Liver increased 2 inches. Some ascites oedema of feet. Skin pale yellow. Red corpuscles 2,000,000 White nearly absent. Numerous microcytes.	Was treated by Iron and Arsenic for 3 weeks but got worse. On April 10th put on 1 tabloid bone marrow per diem - improved so that by May 22nd Red corpuscles 4,300,000 Haemoglobin 66% Ascites disappeared recovered his colour but spleen did not alter. Was still well in September - still taking the tabloids.

CASES OF PERNICIOUS ANAEMIA TREATED BY TRANSFUSION.

Reported by Dr Brackenridge M.D., F.R.C.P.

name & age	Symptoms and Duration.	Previous History	State on admission	Treatment and result
rs G. ge 34 yrs. 1)	Weakness after childbirth Enlarged glands which disappeared Weight 6 st.3 lbs.	Ague some time previously.	Red 1,900,000 Haemoglobin 35%	Transfusion July 5th 6 oz. July 12th 2nd transfusion Aug.7 red 2575000 increasing to 3,000,000 refused further treatment anaemia returned - died in few months
rs A.M. 5 years)	Anorexia loss of flesh for 7½ months.		Weight 6.7½ usual symptoms Red 1,000,000 later 640,000 Poikilocytosis, microcytes nucleated red cells Haemoglobin 20% Temp.99 to 100 No leucocytosis.	Nov.2,1888 Transfusion. 5½ oz. (some coagulation of blood and fainting of patient) Only one transfusion. Patient steadily improved. Red 4,000,000 Haemoglobin 75% Was well in Nov.'92
s F. 27 yrs.)		Worry	Red 705,000 a week later 480,000	Transfusion delayed too long. Died a few days after its performance. Corpuscles increased to 580,000.
S. 9 years)	Illness began with dyspepsia, gradually getting weaker and paler.	Alcoholic at one time.	Blood Red 1,200,000.	Dec.17,Transfusion 5½ oz. Feb.1 red 1,570,000 March 9 Transfusion 4½. Blood-poisoning as result but recovered: red corpuscles increased.
B. years.)	Indigestion 6 months under arsenic. Red fell to 840000		Red corpuscles 890,000.	March 8, Transfusion 1½ oz. Slight blood-poisoning. Corpuscles increased till on Ap.30 reached 4,200,000 haemoglobin 54% Developed tuberculosis.Consol. l.apex. Died. P.M. diffuse Tuberculosis

A TABLE OF SOME CASES OF LEUCHAEMIA.

Name age occupa- tion.	Reported by	Date of beginning treatment	Previous Symptoms	History of Malaria	Symptoms during treatment such as optic neuritis & haemor- rhage	State on beginning treatment	Spleen Liver Lymphatic Glands	Blood	Treatment	Result.
Pt. 25 Policeman (1)	F.Taylor, M.D. Nov. 23 '94 Clin: Soc: Trans: Vol.28.	Nov.3 '92	Abdomen hard for 5 months. Loss of colour 1 year. Loss of strength & flesh. Severe abdominal pain and diarrhoea 3 weeks. Severe pain in left lum- bar re- gion on Oct.23rd.	No mala- ria. Has had scar- latina measles quinzy Influenza Gonorr- hoea.	No optic neuritis No hae- morrhage.	Had good colour, did not show ex- treme anaemia.	Spleen 3 in. below umbilicus, creaking rub over it. Liver and glands not en- larged.	Red cells 1,880,000 White 1,000,000 at end of treatment red 3,630, 000, white 20,000.	Arsenic - at first Liq: Arsenicalis m.5 t.d.s. increased to m.15 t.d.s. Inhaled oxygen 30 litres daily.	Left hospital Jan.4 '93. Spleen reached umbili- cus, weight in- creased from 11- 9½ to 14-4. On June 11, '94 los- ing flesh spleen reaches Poupart's ligament.
Pt. 25 (2)	Sticker Munchau- sen Med: Wocken- schrift XXXIII 43, 44, 1886.	May 5, 1885	Been ill 3 years.		Pain and tenderness over sternum oedema ascites.		Spleen & liver en- larged glands not noticed sternum painful & tender.	Red cor- puscles 1 to white 2. Propor- tion be- came nearly normal under treatment	Inhalation of 30 litres oxy- gen daily. In- creased to 60 litres on June 19th.	Excess of white cells at once decreased Aug.22 proportion nearly normal Oedema gone. Weight from 113 to 126 lbs. Sept.6 went home, discontinued treatment; re- turned to hospi- tal, went down- hill in spite of oxygen. Died, Autopsy confirm- ed diagnosis.

Name age occupa- tion.	Reported by	Date of beginning treatment	Previous Symptoms	History of Malaria	Symptoms during treatment such as optic neuritis & haemor- rhage	State on beginning treatment	Spleen Liver Lymphatic Glands	Blood	Treatment	Result.
W.S. 21 (3)	D.Drew, M.B. Clin: Soc: Trans: Vol.25, May 27, '92.	Aug.12, '91.	Well till 3 months before this, then weakness & loss of flesh.	No his- tory of malaria always lived in London.	Systolic apical murmur. Abdominal pain due to arsen- ic. No haemor- rhage or optic neuritis.		Spleen 3 ins. below umbilicus No en- larged liver. Glands not noted	Red cor- puscles 70% nor- mal. White 1 to 14 red; im- proved during treatment, red 88%, white 1 to 400.	Liq: Arsenica- lis m.ii ter die. Increased up to 100 m. daily by Nov. 4th.	Excess of white corpuscles dis- appeared. Spleen receded to above umbilicus - general health much improved.
C.R. 26 Italian Ice-cream seller. (4)	W.Ord, M.D. Clin: Soc: Trans: Vol. XXV.		Swelling of left side, loss of flesh, increas- ing weak- ness for 5 months before admission	No his- tory of malaria. Rheumatic fever when 15.	Oedema & anasarca due to acute nephritis. Blood & albumen in urine Retinal Haemor- rhage.	Acute nephritis	Spleen reached umbilicus filling R.hypo- chondrium lumbar & part of R. iliac re- gion. Liver 2 ins. below costal margin.	Consider- able de- crease of red cor- puscles, marked increase of white	First treated for the acute nephritis, then put on Liq: Arsenicalis m.8 t.d.s.	A month after spleen $\frac{1}{2}$ former size only slight increase of white corpuscles Improvement might partly be due to cure of Bright's disease
V.C. 40 School- master. (5)	W.Ord, M.D. in above	Feb. 26.	Abdominal swelling for 7 mos. vomiting 3 wks be- fore, ab- dominal pain, diar- rhoea. Bleeding from gums subject to epis- taxis.	No par- ticular history.	Diarrhoea due to mucous colitis sight get- ting dimmer. Haziness of both optic discs. A few small haemor- rhages.	Suffering from mu- cous co- litis. Severe diarrhoea No dropsy.	Spleen down to umbilicus and up to 7th rib. Liver enlarged	Excess of white cor- puscles. 16 times normal number.	Diarrhoea first treated with Bismuth & opium. On Feb. 26, Liq: Arseni- calis m.5 Sod. Hypophosph. gr.15 t.d.s.	Improved rapidly, till March 4th. Spleen receded con- siderably.

Name age occupa- tion.	Reported by	Date of beginning treatment	Previous Symptoms	History of Malaria	Symptoms during treatment such as optic neuritis & haemor- rhage	State on beginning treatment	Spleen Liver Lymphatic Glands	Blood	Treatment	Result.
A.J. 36 School- master (6)	W.Ord & J.M.Cope- man Clin: Soc: Trans: Vol.XXIV May 22'91	May 8'88	Enlarged abdomen since 1886. Pain in left side 86 to 88. Weakness, palpita- tion, vertigo, gum- bleeding, slight cough.		Under treatment 3 yrs. Ascites from time to time, gradual loss of strength, severe headaches, bleeding from gums and nose. At one period retinal haemor- rhage.	Appetite good, not much loss of flesh. Transi- tory gripping pains.No dyspnoea.	Spleen en- larged to rt.of middle line to within 2 inches of symphysis pubis. Liver somewhat enlarged.	Like pus under the microscope White corpuscles from 1 to 4 to 1-8 red. Red 2,052, 000 to 3,500,000.	Liq: Arseni- calis m.5 t.d. s.with Sod. Hypophosph: & Woodhall Spa water. Rest. Generous diet.	Was admitted and discharged several times during 3 yrs. of treatment. When arsenic was ceased he lost ground. He finally died, the spleen diminished in size while in hospital.
E.O'B.49 married. (7)	Warring- ton Ho- ward Clin: Soc: Trans: Vol. XV. Mch.4'82.	7 July'81	Pain in left hy- pochon- drium, worse at night for 18 months. Hard ab- domen, pains in back.	No his- tory of ague. Typhus fever in Spain 10 yrs.be- fore. No chil- dren.		Stout wo- man, good complex- ion, does not look anaemic. Temp. pulse respira- tion normal, urine normal.	Spleen ex- tends from ribs to groin and to 3 ins.to rt.of um- bilicus - smooth, not tender Liver and glands normal.	White cor- puscles number about 1/6 of the whole.	Excision of spleen July 13th.	Death same evening from shock, not much haemorrhage.